Your Global Automation Partner

TURCK

EZ-track®
Q21 Series LDT

Manual

The **Q21 Series** is an accurate, programmable, auto-tuning, non-contact, linear displacement transducer in an economical, low profile package. The transducer utilizes field proven magnetostrictive technology to give absolute position, repeatable to .01% of the programmable sensing distance. The streamlined anodized aluminum extrusion houses the sensing element and electronics. The magnet moves over the sensing element that determines the position and converts it to an analog output. It can be ordered with a 0 to 10 V, -10 to 10 V, 0 to 5 V, - 5 to 5 V or 4 to 20 mA output.

The **Q21 Series** has a few truly unique features. The first one being the LDT's auto-tuning capability, the ability to sense a magnet other than the standard slide magnet and adjust its signal strength accordingly. Another feature is the analog output is programmable over the entire active stroke length. The active stroke area of the LDT lies between the Null and Dead zones.

There is a diagnostic LED located at the connector end of the probe that remains green while a good magnet signal is present within the programmed stroke area. The LED turns yellow when the magnet is out of the programmed active range, but still within the active stroke area. The LED turns red and the output goes to 0 volts on voltage output units, or 4 mA on current output units when there is no magnet present or when the magnet is out of the sensing area.

The unit can easily be changed in the field.

From	To
0 to 10 V	10 to 0 V
4 to 20 mA	20 to 4 mA
-10 to 10 V	10 to -10 V
-5 to 5 V	5 to -5 V
0 to 5 V	5 to 0 V

NOTE 1:
The Q21 is FM approved for use in a class 1, Division 2, groups A, B, C, D applications when installed and wired per drawing NI-1.003. See page 6 for a copy of this document

NOTE 2:
If your application does not require FM Class 1, Division 2 approval, wire the Q21 using a standard 4 pin ***eurofast***® cordset from Turck.

Accessories

Item	Part Number
Slide Magnet	SM-Q21
Float Magnet	FM-Q21
Mounting Foot	MB-Q21
2 Meter Cable, Straight Cordset	RK 4.4T-2/S618
4 Meter Cable, Straight Cordset	RK 4.4T-4/S618
2 Meter Cable, Right Angle Cordset	WK 4.4T-2/S618
4 Meter Cable, Right Angle Cordset	WK 4.4T-4/S618

Input Voltage	10-30 VDC	
Current Draw	**Voltage Units**	**Current Units**
	80 mA max. @ 10 VDC	90 mA max. @ 10 VDC
	35 mA max. @ 30 VDC	55 mA max. @ 30 VDC
Output	0 to 10 V	4 to 20 mA
	10 to 0 V	20 to 4 mA
	0 to 5 V	
	5 to 0 V	
	-5 to 5 V	
	5 to -5 V	
	-10 to 10 V	
	10 to -10 V	
Output Load		
Current Output	≤ (Voltage in -4) ÷20mA (example: 10 V ≤300 Ω)	
Voltage Output	≥1000 Ω (1.5k Ω for +/- 10V)	
Linearity	+/- 0.05% of stroke or +/- 0.028 inches, whichever is greater	
Accuracy	+/- 0.1% of stroke or +/- 0.050 inches, whichever is greater	
Repeatability	+/- 0.01% of full stroke or +/- 0.014 inches, whichever is greater	
Operating Temperature	-40° to +70°C (-40° to 158°F)	
SPAN Length	4 to 180 inches	
Null Zone	3.00 inches	
Dead Zone	1.50 inches	
LED	Green = Power is applied and magnet is present in the programmed range Red = Fault; magnet is in the Null Zone, Dead Zone, or lost Yellow = Magnet is out of the active programmed range, but still within the active stroke area	
Connector	Standard, shielded 4-pin, M12x1 ***eurofast®***	
Agency Approvals	CE Approved, FM Approved	
Enclosure	IP 67,IP68 optional	
Shock	40 g, 11 ms	
Vibration	20 Hz to 2 kHz at 10 g RMS	
Update Time	1 mS (Stroke Length 4" to 50") 2 mS (Stroke Length 51" to 100") 3 mS (Stroke Length 101" to 150") 4 mS (Stroke Length 151" to 180")	

Functional Overview

Mounting Instructions

The transducer can be mounted vertically or horizontally using **MB-Q21** Mounting Brackets. The mounting brackets slide in the grooves on the lower part of the extrusion and clamp down when tightened. It is recommended to use one mounting bracket on each end and every three feet between. Ferro-magnetic material, (material readily magnetized) should be placed no closer than .25 inches from the sensing surface of the LDT.

NOTE:
If using the floating magnet option, you must set the automatic gain control.

Automatic Gain Control (AGC)

The Automatic Gain Control feature is only used when sensing a magnet other than the standard **SM-Q21** Slide Magnet. If you are using the standard slide magnet skip to **Setting ZERO and SPAN Position.**
When using the Floating Magnet assembly **FM-Q21**, the magnet should be installed within .375 inches (9.53 mm) of the sensing surface. The magnet assembly should also be installed in such a manner that it remains an even distance from the aluminum extrusion throughout the entire stroke. Improperly installed magnets can result in output signal non-linearity.

NOTE:
The north pole of the magnet should be pointed towards the probe.

To set the Automatic Gain Control (AGC) level for the probe, follow these steps:

1. Place magnet assembly close to the dead zone (but within the active region) of the probe.
2. Power down the probe.
3. Short program pin (pin 2) to ground (pin 3).

NOTE:
When the probe is in AGC mode, the output will be either 0 volts or 4 mA, depending on the model that was ordered.

4. Apply power to probe:
   a. The LED flashes RED indicating it is in the AGC mode.
   b. The LED will change to flashing GREEN when it has determined the proper AGC level and has saved it to non-volatile memory.

The AGC is now complete.

To place the probe back into the normal operating mode, follow these steps:

1. Power down the probe.
2. Remove short from program pin.
3. Apply power to the probe.

Setting ZERO and SPAN Position

The **Q21 Series** is programmable over the entire active stroke length of the LDT. Keep in mind, there is a 3 inch Null area at the connector end of the LDT, and a 1.5 inch Dead area at the other end of the LDT where the magnet cannot be detected. The diagnostic LED can aid you in the setup of the ZERO and SPAN. A green or yellow LED means that the LDT can be programmed in this area, a red LED means that the LDT cannot be programmed in this area. To set the ZERO and SPAN position for the probe, follow these steps:

1. Power up the probe in normal operating mode (i.e. program pin floating).
2. Place magnet assembly where **ZERO** is to be located but within the active region of the probe.
3. Momentarily short program pin (pin 2) to ground (pin 3).
4. Place magnet assembly where **SPAN** is to be located but within the active region of the probe.
5. Momentarily short program pin (pin 2) to V+ (pin 1).

NOTE:

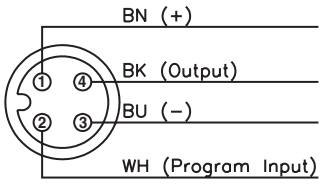
A. **AGC** should be set first before setting the **ZERO** and **SPAN** positions when using a floating magnet
B. **SPAN** could also be set first, followed by setting the **ZERO** position
C. **ZERO** and **SPAN** can be adjusted individually without setting the other
D. **ZERO** = 0 V on 0 to 10 VDC units, -10 V on -10 to 10 VDC units, and 4 mA on 4 to 20 mA units

Functional Overview (continued)

LED Colors
Green: Magnet is present and within the active programmed range.
Red: Fault; The LDT has lost its signal from the magnet or the magnet has moved into the Null or Dead Band.
Yellow: The magnet is out of the programmed ZERO to SPAN range, but still within the active stroke area.

Wiring Diagrams

Q21 Wiring Connections
Once the LDT has been installed, wiring connections can be made. There are two groups of connections you will need to make. They are as follows:
• Power Supply Connections (including ground and shield)
• LDT Input/Output Connections



Wiring Diagram

Power Supply/Ground Connections
The Q21 standard cable is a 4 Pin, 12mm, ***eurofast***® cordset. It has 4 conductors of 22AWG, with an aluminum/ polyester foil shield with drain wire. Cable O.D. is .21" (5.3mm). To reduce electrical noise, the shield must be properly used. Connect the cable's shield to the controller system GND.

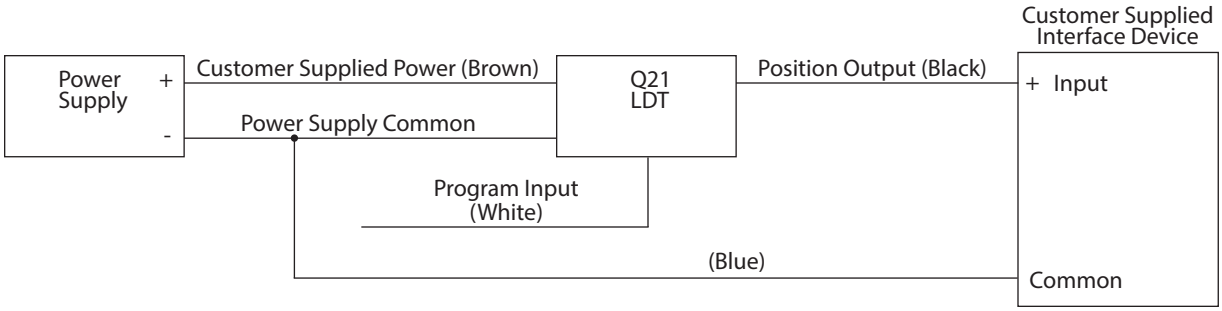
NOTE:
Do Not Use Cordsets with LED's

Always observe proper grounding techniques such as single point grounding and isolating high voltage (i.e. 120/240 VAC) from low voltage (10-30 VDC cables). Whenever possible, this cable should be run in conduit by itself. The power supply common, the cable shield and a good earth ground should be connected together at the location of the power supply common.

WARNING:
Do not route the Q21 output cable near high voltage sources.

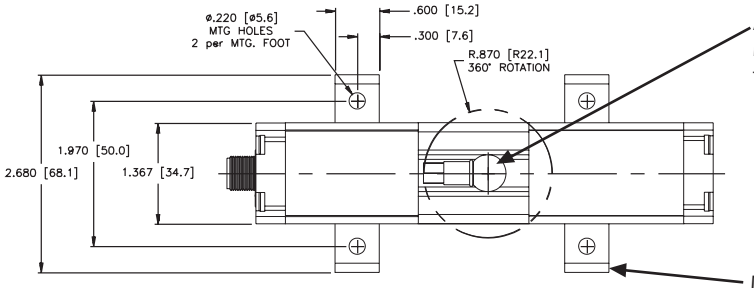
In order for the Q21 to operate properly, the LDT's external power supply must provide a voltage between +10 to +30 VDC. The power supply must be rated at 100mA minimum. The power supply should provide less than 1% ripple and 10% regulations. (The power supply should be dedicated to the LDT to prevent noise from external loads from affecting the Q21.)

Single Ended Input



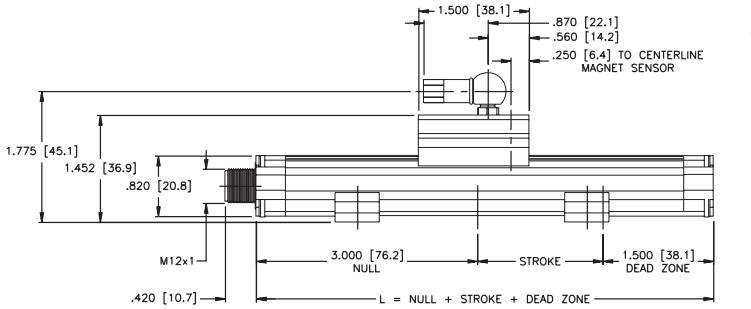
NOTE:
Q21-LI is current sourcing, which allows the current to flow from the LDT into the user's equipment.

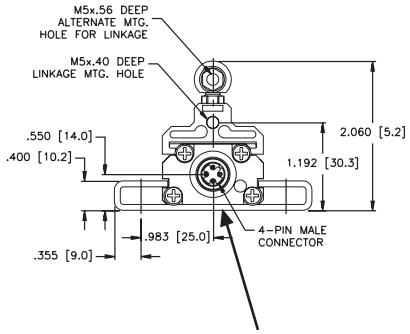
Dimensions



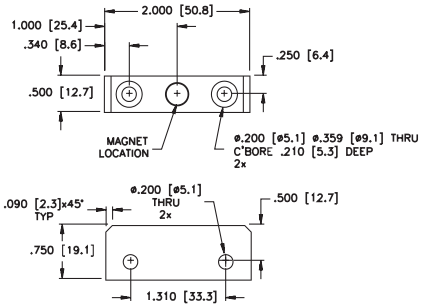
A standard female swivel mounting arm is provided with the Slide Magnet (**SM-Q21**) assembly. For extensions and other options contact the factory.

Mounting Brackets (**MB-Q21**) slide in the grooves on the side of the extruded housing. When tightened down with fastening hardware the mounting brackets clamp the unit into place. It is recommended to use one mounting bracket on each end and every three feet between.





A standard, shielded 4-pin, M12x1 ***eurofast®*** connector is used. Straight mating cables can be ordered in a 2 meter length (RK 4.4T-2/S618), or 4 meter length (RK 4.4T-4/S618). If space is a consideration a right angle connector is also available, (WK 4.4T-2/S618 or WK 4.4T-4/S618).



Floating Magnet (FM-Q21)

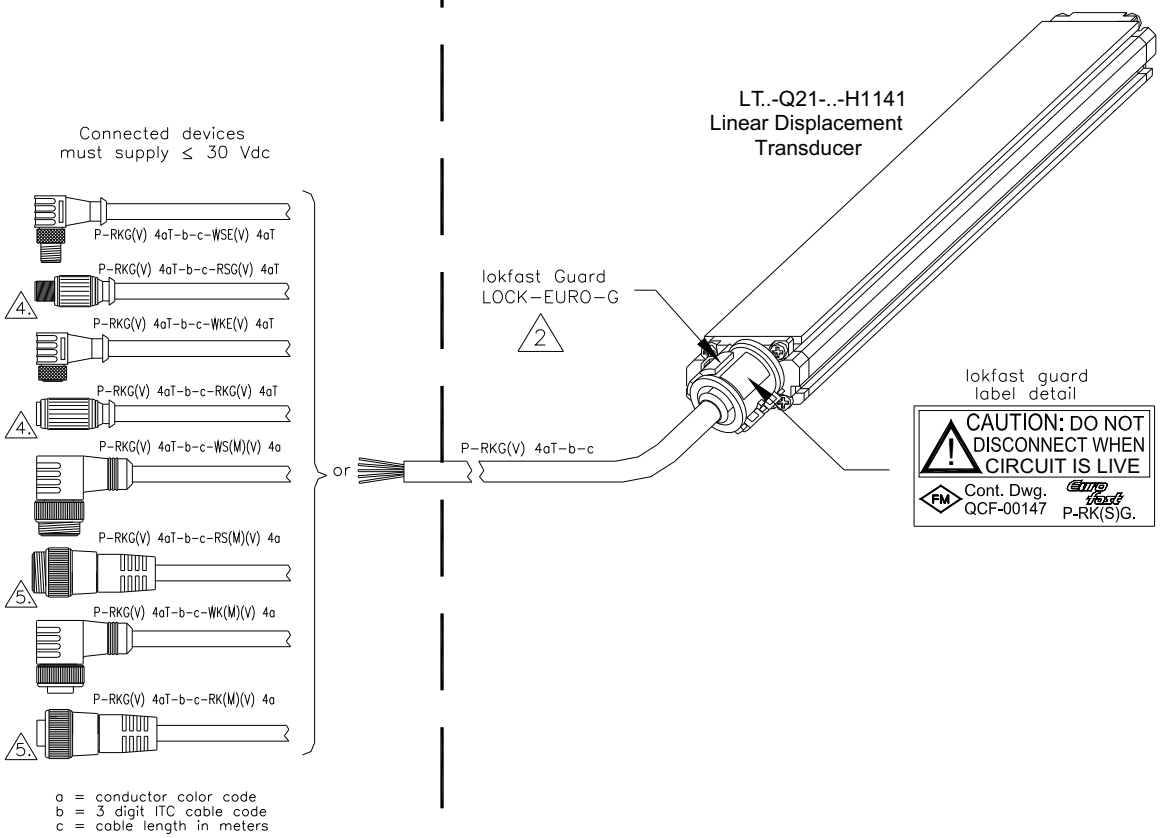
Installation in Class 1, DIvision 2

FM Approved Linear Displacement Transducers

Installation in Class I, Division 2

FM APPROVED

NON–HAZARDOUS LOCATION | HAZARDOUS (CLASSIFIED) LOCATION
Class I, Division 2, Groups A,B,C,D



Notes:

1. Wiring methods must be in accordance with Class I, Division 2 wiring practices per the National Electrical Code (NEC), ANSI/NFPA 70, Article 501.4(B).
2. The transducers must be connected using FM–approved Turck cordsets as shown. The cordsets are FM approved for installation in Class I, Division 2 when installed per Turck control drawing QCF–00147, available at www.turck.com/fmcd.
3. A LOCK–EURO–G guard must be in place as shown when the circuit is energized.
4. Straight eurofast connectors may also be terminated in the hazardous location when used with approved Turck receptacles and LOCK–EURO–G lokfast guards.
5. Straight minifast connectors shown may also be terminated in the hazardous location when used with approved Turck receptacles and LOCK–MINI lokfast guards.

Rev	Description	Drft	Date
A	Release BVL	BVL	5/7/04

Drawing No.: NI-1.003	TURCK 3000 Campus Drive Plymouth, MN 55441 Phone: (763) 553-7300
Title: LT..-Q21-..-H1141 Linear Displacement Transducers Installation in Class I, Division 2 Hazardous Locations	
Scale: NONE	Sheet 1 of 1

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